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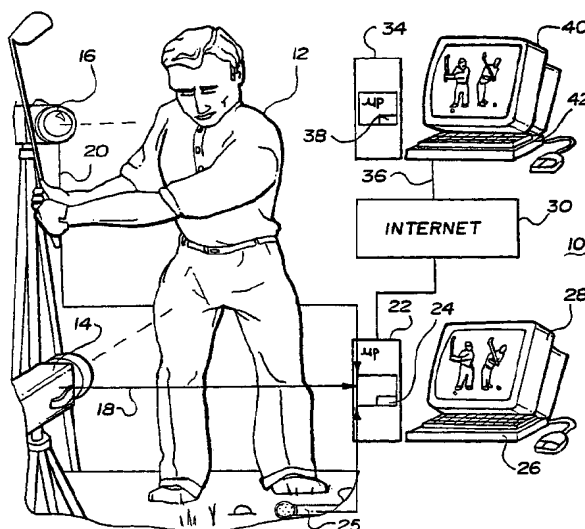
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(54) Title: **SYSTEM AND METHOD FOR TEACHING A PHYSICAL SKILL**



(57) Abstract: A method and system are disclosed for teaching a physical skill, such as golf, to a student. The system includes cameras (14, 16) which create a series of images representative of the student performing the physical skill. These images are then stored in digital format by a computer system (22) so that the series of digital images is accessible from a telecommunication network, such as the Internet. An expert in the physical skill then accesses the images from the network using computer equipment physically accessible by the expert. The expert then examines and creates a series of annotated digital images of the student performing the physical skill. These annotated digital images are then stored such that these annotated images are accessible at a subsequent time by the student via the telecommunication network.

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SYSTEM AND METHOD FOR TEACHING A PHYSICAL SKILL

Background of the Invention

I. Field of the Invention

The present invention discloses both a method and system for teaching
5 a physical skill, such as golf, to a student.

II. Description of the Prior Art

There are many physical activities, such as sporting activities, musical
instruction and the like, which require that a student learn a physical skill in
order to improve his or her skills. Traditionally, such physical skills have been
10 taught by those more skilled in that particular skill, referred to as “experts”
herein, on a one-to-one basis. Such one-to-one instruction for many physical
skills, e.g. golf, inherently has several shortcomings.

One major disadvantage of the previously known one-on-one
instruction is that it necessarily requires both the expert and the student to be
15 available at the same time. In many cases, it is difficult if not altogether
impossible due to scheduling conflicts for the student to arrange a time for his
or her lesson that is convenient with the expert.

A still further disadvantage of the previously known system of one-on-
one instruction is that, even though the student may learn a particular technique
20 during the lesson, that technique is soon forgotten following the conclusion of
the lesson. Consequently, since the student oftentimes forgets one or more
techniques taught by the expert during the lesson, the overall effectiveness of
the lesson is necessarily lessened.

A still further disadvantage of one-on-one instruction for many physical skills is that it requires the student and expert to be located in the same geographic area. In many cases, however, the expert for a particular physical skill most suitable for teaching a particular student or students is located in a different geographic area. When this occurs, as a practical matter, one-on-one lessons simply cannot be given.

Summary of the Present Invention

The present invention provides both a system and method for teaching a physical skill, such as golf, which overcomes all of the above-mentioned disadvantages of the previously known methods and systems. Although the physical skill described in this patent is limited to the game of golf, it will be understood that the term "physical skill" as used in this patent includes not only the game of golf but also other sports, musical instruction, handicrafts such as woodworking, and other artistic endeavors, as well as any activity which requires a physical skill to master.

In brief, the present invention comprises a means for creating a series of student digital images representative of the student performing the physical skill. For example, such a series of digital images can comprise images showing a golf ball being struck by the student golfer. These digital images can be taken from one, two or even more different angles with respect to the golfer.

The digital images of the student golfer are then stored so that the digital images are accessible to a telecommunication network. Conventionally,

the digital images are stored in persistent memory, such as a hard drive, contained in a computer system physically accessible by the student golfer. This computer system then communicates with a telecommunication network, such as the Internet, via conventional telephone lines connected by modem to
5 the student's computer system.

An expert in the physical skill, i.e. an expert golfer, then accesses the student images from the telecommunication network using a computer system physically accessible by the expert. The expert then utilizes software on the expert's computer system to not only view but annotate the digital images of
10 the student performing the physical skill. These annotations would include, for example, instruction on what the student is doing wrong as well as what the student is doing right.

After the expert completes the annotated digital images, the expert stores the annotated digital images in a fashion such that the digital images are
15 accessible from the telecommunication network. In the preferred embodiment of the invention, the expert transfers the digital images to an Internet provider or to an Internet web site.

Thereafter, and at the convenience of the student golfer, the student golfer accesses the annotated digital images from the telecommunication
20 network. The student then utilizes the annotated digital images to improve his or her golf swing or other physical skill.

Monetary charges from the expert for producing the annotated digital images are preferably remitted by the telecommunication network in order to compensate the expert.

5 The present invention thus achieves several advantages over the previously known one-on-one teaching methods for teaching a physical skill. First, since the digital images, both the original images as well as the annotated images, are accessible to the Internet, the creation of both the digital images as well as the annotated images can be done at a time convenient to the student and expert, respectively. As such, scheduling conflicts between the student and expert are completely avoided.

A still further advantage of the system and teaching method of the present invention is that, since the annotated images are stored in a fashion accessible to the Internet, the student can repeatedly view and review the annotated images thus effectively repeating the lesson whenever necessary.

15 A still further advantage of the system and method of the present invention is that it is no longer necessary for the student and expert to be geographically accessible to each other. Since the telecommunication network is utilized to convey the annotated digital images back to the student, the physical location of the expert is simply unimportant and plays no part whatsoever in the lesson.

Brief Description of the Drawing

A better understanding of the present invention will be had upon reference to the following detailed description, when read in conjunction with

the accompanying drawing, wherein like reference characters refer to like parts throughout the several views, and in which:

FIG. 1 is a block diagrammatic view illustrating a preferred embodiment of the present invention; and

5 FIGS. 2A-2D are video images depicting an exemplary application of the system and teaching method of the present invention.

**Detailed Description of a Preferred
Embodiment of the Present Invention**

10 With reference first to FIG. 1, a block diagrammatic view of the system of the present invention is there shown for teaching a physical skill to a student 12. In this description, the physical skill is a game of golf in which the student performs the skill by a golf swing. It will be understood, of course, that the game of golf is by way of example only and that the physical skill can be
15 other sport activities, musical instruction, artistic endeavors and the like.

In the system 10, the golfer performs the physical skill, i.e. the golf swing, at a location convenient to the golfer 12 such that the golf swing is recorded by at least one and preferably two cameras 14 and 16. Preferably, the cameras 14 and 16 are positioned to record two different visual aspects of the
20 student's golf swing, e.g. one camera in front of the student and one camera to one side of the student.

The cameras 14 and 16 are typically established at a location which attracts golfers. Such locations would include, for example, golf courses, golf ranges, golf shops and the like.

The output 18 and 20 from the cameras 14 and 16, respectively, are coupled as input signals to a computer 22 which is physically accessible by the student 12. The computer 22, under software control, then stores a series of student digital images representative of the student performing the golf swing in persistent memory 24, such as a hard drive.

In order to create the digital images, the cameras 14 and 16 may comprise digital cameras which provide a digital input signal to the computer 22. The computer 22 then accesses this digital signal and stores the digital signal in the persistent memory 24 in any conventional fashion.

Alternatively, however, the cameras 14 and 16 may be analog cameras which provide analog output signals on their outputs 18 and 20, respectively. In that case, the analog output signal is digitized by an analog/digital (A/D) converter contained either within the computing system 22 or between the camera input signals to the computer system 22 and the cameras 14 and 16.

Although any conventional means can be utilized to initiate the digital images of the student performing the golf swing, in the preferred embodiment, the computer 22, once activated, continually stores images of the student 12. A microphone 25 is positioned near the golf ball which detects the sound of the golf club hitting the golf ball. The output from the microphone 26 is coupled as an input signal to the computer 22.

Whenever the computer 22 receives an input signal from the microphone 26 indicative that the golf ball has been struck, the computer 22 under software program control deletes or ignores all digital images occurring

prior to a preset time period, for example one and one-half seconds, prior to the impact of the golf club with the golf ball. Since most golf swings require less than one and a half seconds between the initiation of the back stroke and to the time that the golf ball is struck, the entire time between the back stroke and to the impact of the ball is recorded as a series of digital images by the computer 5 22. Similarly, the computer 22, under program control, continues to record the digital images from the cameras 14 and 16 following impact of the golf club with the golf ball for a preset time period, for example one-half second. In this fashion, a series of digital images representative of the student performing the physical skill or golf swing are recorded for the entire golf swing in the 10 computer persistent memory 24.

Still referring to FIG. 1, the computer 24 preferably includes an input mechanism, such as a keyboard 26, as well as a video monitor 28. The keyboard 26 enables the student, following his performance of the physical skill or golf swing, to instruct the computer 22 via the keyboard 26 to display 15 or replay the golf swing on the monitor 28. Assuming that the student 12 is satisfied with the golf swing, the student 12 instructs the computer 22 via the keyboard 26 to transmit the series of digital images stored in the persistent memory 24 in a fashion such that the images are accessible via a telecommunication network, such as the Internet 30. For example, the series of 20 digital images may be transmitted by the computer 22 through conventional telephone lines 32 to an Internet web site.

The keyboard 26 at the computer 22 accessible by the student 12 also enables the student 12 to input information regarding payment. For example, the student 12 can input credit card information or the like which is also transmitted to the web site on the Internet 30. Alternatively, a card reader may
5 be used by the computer 22 in order to record financial information for a purpose which will become shortly apparent.

With reference now to FIGS. 1 and 2A-2D, FIGS. 2A and 2C represent two of the stored images of the student performing the physical skill at different positions of the golf swing. Furthermore, each of the cameras 14 and
10 16 preferably generate a picture having a preset horizontal and vertical number of pixels. The images from the two cameras 14 and 16, however, are horizontally compressed so that the resulting image of the student performing the physical skill as depicted in FIGS. 2A and 2C contains the same number of horizontal and vertical pixels. This enhances compression of the data as it is
15 transmitted along the telecommunication network 30.

An expert in the physical skill, i.e. a professional golfer, has a computer 34 physically accessible by the expert. This computer 34 is interconnected with the telecommunication network 30, preferably by modem and conventional telephone lines 36. The expert computer 34 also includes
20 persistent memory, such as a hard drive 38, a video monitor 40 and an input device 42 such as a keyboard, mouse and/or light pen.

The expert downloads or receives the images of the student performing the physical skill from the telecommunication network 30 at the expert's

convenience and, under program control, stores these images on the persistent memory 38 of the expert's computer 34. The computer 34, under software control, then displays the student images, preferably in an uncompressed state, on the monitor 40. The software at the expert's computer 34 is capable of
5 displaying the images on a frame-by-frame basis.

As the images are displayed on the expert's monitor 40, as best shown in FIGS. 2B and 2D, the expert, utilizing the input device 42, adds annotations 44 to the student video images performing the physical skill. These annotations 44 may include, for example, comments as to what the golfer is
10 doing right, what the golfer is doing wrong, and/or what the golfer should do to correct one or more defects in his or her golf swing. Software which enables digital images to be annotated and stored are well known so that a further description thereof is unnecessary.

Following annotation of the series of student digital images by the
15 expert, this series of annotated digital images are then stored in the persistent memory 38 at the expert's computer 34, at least on a temporary basis. The expert then "uploads" the annotated digital images to the web site on the telecommunication network 30. Thereafter, these annotated digital images may be retrieved, viewed and reviewed by the student at his or her convenience.

20 At least a part of the financial remuneration made by the student is typically paid to the expert golfer, preferably via the Internet. Similarly, appropriate passwords and the like are used by the web site containing the

student digital images as well as the annotated images to ensure that access to these images is limited to the appropriate person or persons.

From the foregoing, it can be seen that the present invention provides a novel system and method for teaching a physical skill which overcomes many disadvantages of the previously known methods and systems. Most
5 importantly, the system of the present invention no longer requires both the student and expert to be present at the same time in order to conduct the lesson. Instead, the system of the present invention allows not only the student and the expert to be geographically separated from each other, but also allows the
10 student and the expert to perform their respective functions during time periods convenient to both the student and the expert.

Having described my invention, however, many modifications thereto will become apparent to those skilled in the art to which it pertains without deviation from the spirit of the invention as defined by the scope of the
15 appended claims.

I claim:

Claims

1 1. A system for teaching a physical skill to a student comprising
2 means for creating a series of student digital images representative of
3 the student performing the physical skill,
4 means for storing said series of student images so that said series of
5 student images are accessible from a telecommunication network,
6 accessing said series of student images from said telecommunication
7 network by an expert in the physical skill,
8 means for annotating said series of student digital images by the expert
9 to form a series of annotated digital images,
10 means for storing said annotated digital images so that said annotated
11 digital images are accessible from said telecommunication network, and
12 means for accessing said annotated digital images from said
13 telecommunication network by the student.

1 2. The invention as defined in claim 1 wherein said
2 telecommunication network comprises the Internet.

1 3. The invention as defined in claim 1 and comprising a computer
2 system physically accessible by the student, said computer system having
3 persistent memory, wherein said means for storing said series of student
4 images step comprises means for storing said digital images in said persistent
5 memory on said computer system.

1 4. The invention as defined in claim 3 wherein said means for
2 storing said series of student images step further comprises means for
3 transmitting said student digital images to the telecommunication network via
4 telephone lines.

1 5. The invention as defined in claim 3 and comprising a video
2 monitor connected with said computer system and means controllable by said
3 student for displaying said series of student digital images on said monitor.

1 6. The invention as defined in claim 5 wherein said means for
2 storing said student digital images further comprises means controllable by said
3 user for selectively storing said student digital images after viewing said
4 storing said student digital images on said monitor.

1 7. The invention as defined in claim 1 and comprising a computer
2 system having a monitor and physically accessible by the expert, and wherein
3 said annotating means comprises a software program for selectively displaying
4 individual images on said monitor, user input means to said computer system
5 for modifying individual student images by the expert to form said series of
6 annotated digital images.

1 8. The invention as defined in claim 7 wherein said input means
2 comprises a keyboard.

1 9. The invention as defined in claim 7 wherein said input means
2 comprises a mouse.

1 10. The invention as defined in claim 1 wherein said means for
2 creating a series of student digital images comprises means for creating two
3 different series of student digital images of the student performing a single act
4 of the physical skill from at least two visual angles.

1 11. The invention as defined in claim 10 wherein each series of
2 student digital image comprises a preset number of horizontal and vertical
3 pixels, and comprising means for compressing each of said two different series
4 of student digital images of the student performing the single act of the
5 physical skill into a single series of student digital images, each compressed
6 image having said preset number of horizontal and vertical pixels.

1 12. The invention as defined in claim 3 and comprising a student
2 operated input means connected to the computer system for entering a payment
3 to be remitted at least in part to the expert.

1 13. The invention as defined in claim 12 wherein said input means
2 comprises a key pad.

1 14. The invention as defined in claim 12 wherein said input means
2 comprises a credit card reader.

1 15. The invention as defined in claim 1 wherein said storing means
2 comprises means for audibly detecting a predetermined position of the student
3 performing the physical skill, said storing means having means for storing only

4 digital images for a first preset time period prior to said predetermined position
5 and for a second preset time period after said predetermined position.

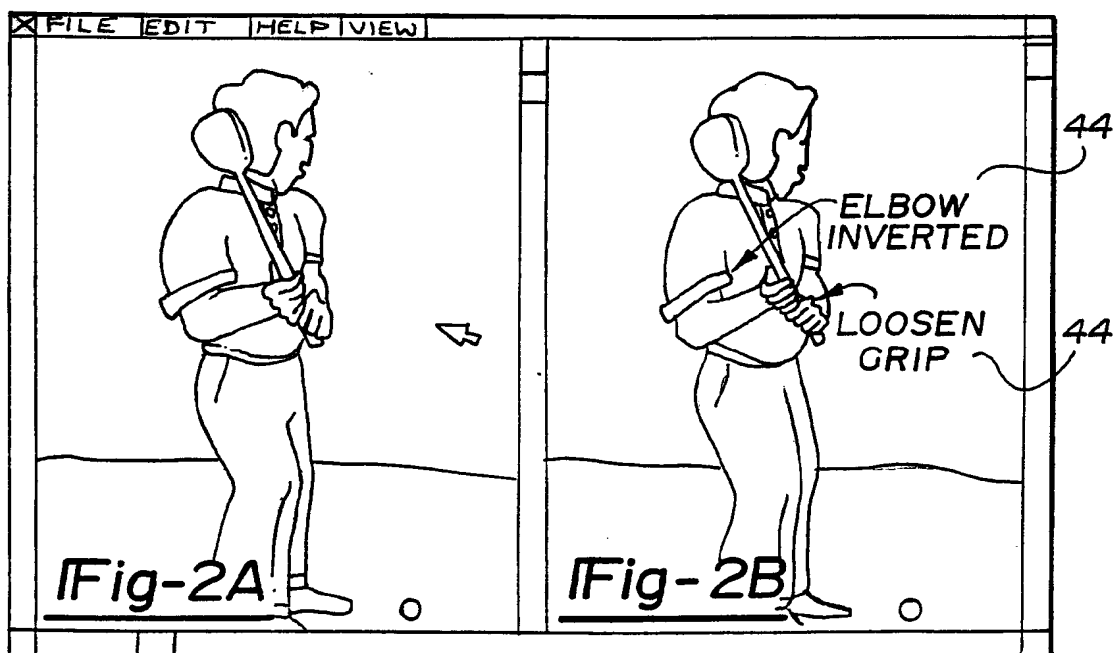
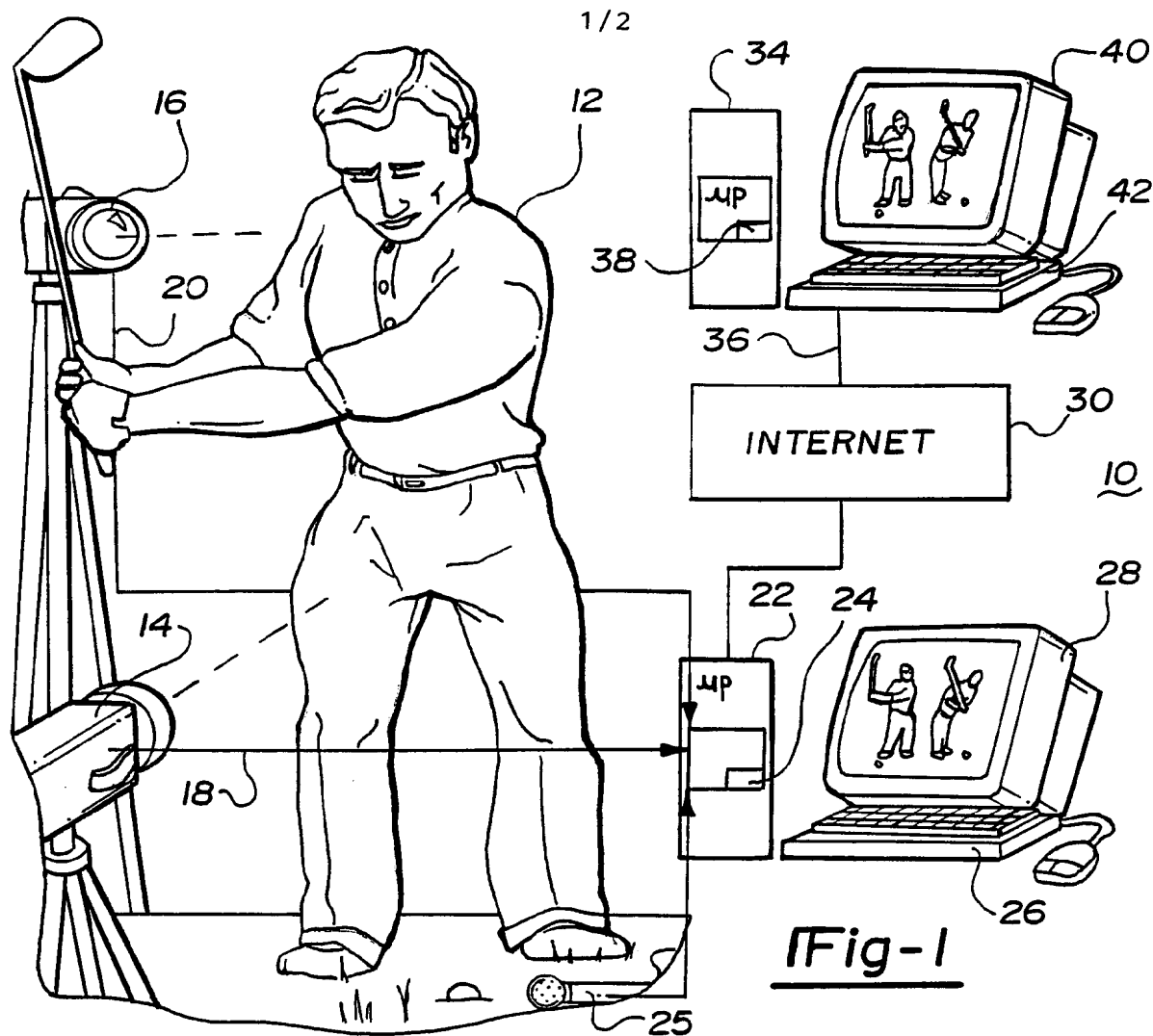
1 16. A method for teaching a physical skill to a student comprising
2 the steps of:
3 creating a series of student digital images representative of the student
4 performing the physical skill,
5 storing said series of student images so that said series of student
6 images are accessible from a telecommunication network,
7 accessing said series of student images from said telecommunication
8 network by an expert in the physical skill,
9 annotating said series of student digital images by the expert to form a
10 series of annotated digital images,
11 storing said annotated digital images so that said annotated digital
12 images are accessible from said telecommunication network, and
13 accessing said annotated digital images from said telecommunication
14 network by the student.

1 17. The invention as defined in claim 16 wherein said
2 telecommunication network comprises the Internet.

1 18. The invention as defined in claim 16 wherein said storing said
2 series of student images step comprises the steps of storing said digital images
3 in persistent memory on a computer system physically accessible by the
4 student.

1 19. The invention as defined in claim 18 wherein said storing said
2 series of student images step further comprises the step of transmitting said
3 student digital images to the telecommunication network via telephone lines.

1 20. The invention as defined in claim 16 and further comprising the
2 step of the student remitting a payment to the expert via the telecommunication
3 network.



2/2

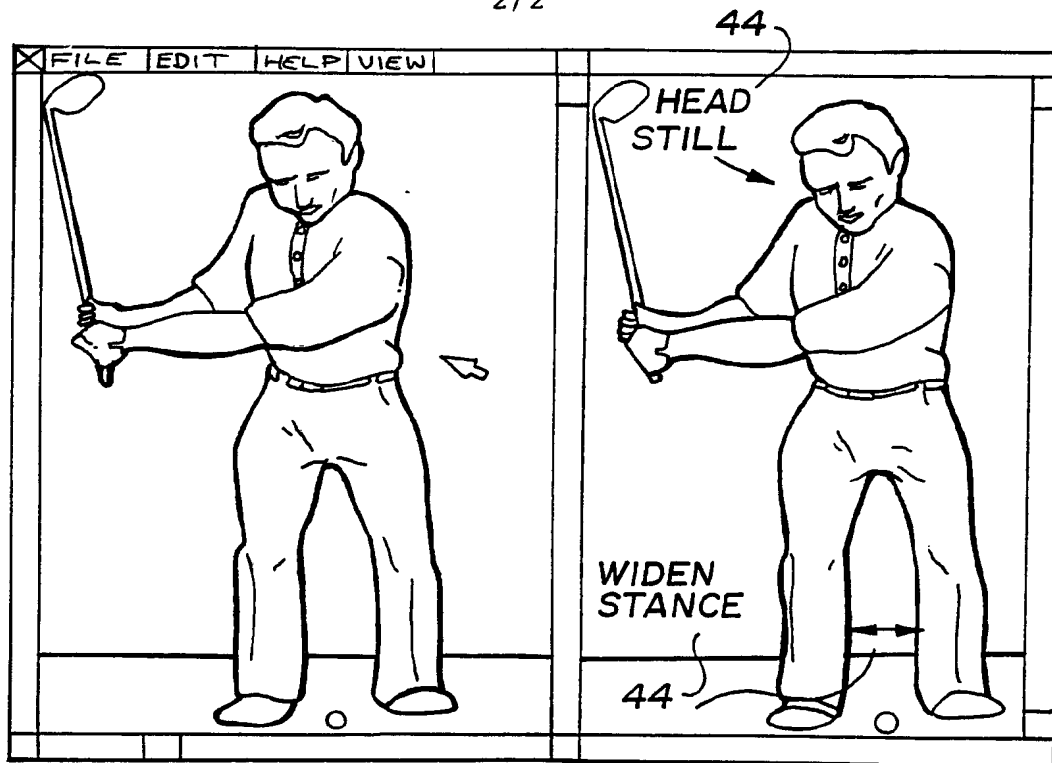


Fig-2C

Fig-2D

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/29068

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :A63B 69/36

US CL :434/252

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 434/252, 247, 249; 473/199, 202, 409

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,486,001 A (BAKER) 23 January 1996, see the entire document.	1
A	US 5,823,786 A (EASTERBROOK) 20 October 1998, see the entire document.	1

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search

17 DECEMBER 2000

Date of mailing of the international search report

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Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks

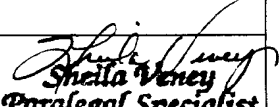
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